

PREY OF THE PEREGRINE FALCON (*FALCO PEREGRINUS CASSINI*) IN
SOUTHERN ARGENTINA AND CHILE

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The Peregrine Falcon (*Falco peregrinus cassini*) in Patagonia attracted wide interest two decades ago (Anderson and Ellis 1981, McNutt 1984) when there was a focus on determining the taxonomic position of the Pallid Falcon (also called Kleinschmidt's falcon and Tierra del Fuego falcon; formerly named *Falco kreyenborgi*). In 1981, however, the pallid falcon was confirmed to be a pale color morph of the peregrine (Ellis et al. 1981, Ellis and Peres 1983), and since that time, little work has been conducted on this color morph. Continent-wide research has continued and has yielded a fair understanding of the breeding distribution of the Peregrine Falcon in South America (Anderson et al. 1988, McNutt et al. 1988, Risebrough et al. 1990). Also, two preliminary food habits studies on the peregrine have been completed in Patagonia (McNutt 1981, Peres and Peres 1985). Together those papers provided a list of 23 species observed as prey, and McNutt (1981) listed another eight species seen pursued (but not captured) by peregrines.

The purpose of this paper is to assemble all that has been published on peregrine food habits for Patagonia and Tierra del Fuego and to add to that list from our 1980 and 1981 expeditions.

METHODS

In November–December of 1980 and 1981, we traveled by motor vehicle searching for eyries in Chubut, Santa Cruz, and Rio Negro provinces of Argentina and in Magallanes, Chile. Although we accessed 16 eyries, some were empty (prey remains sometimes scatter in the wind), so our totals included prey from only 11 eyries. We accessed eyries (normally by rope) and recovered recent prey (feathers, feet, and bones with tendons at-

tached) but discarded those bones that were so bleached that they may be attributed to former occupants of the eyrie. Most of the prey were identified from whole feathers. No pellets were used in this analysis. We included some feathers from the base of the eyrie cliffs, but excluded those that were likely molted by other occupants of the cliff. For example, several of our eyries were in old Black-faced (formerly buff-necked) Ibis (*Theristicus caudatus*) nests within active ibis colonies. Although ibis feathers were frequently found near these eyries and even though we occasionally observed peregrines pursuing ibis, we viewed these attacks near eyries as displacement activities. Only once did we include an ibis as prey and this was after finding four fresh feathers within an eyrie which was neither beneath an ibis roost nor near an ibis nest. McNutt (1981) observed peregrines killing nestling ibis.

No food habits study based on prey remains is without bias (Marti 1987, Bielefeldt et al. 1992). For peregrines, bias derives from the fact that many prey individuals are missed because prey are normally plucked before arrival at the eyrie and many defleshed carcasses are removed by the adults and deposited elsewhere. Also, several castings sometimes represent a single prey item. Common prey are normally under represented in peregrine prey tallies, including our sample, because of the difficulty of totaling individuals. Our method was to derive a minimum count from feet, bills, remiges, and rectrices. For example, a sample of 300 feathers and assorted other remains from one species, and probably representing dozens of individuals, may yield a much smaller minimum count. Conversely, rare prey are likely to be over estimated in most studies including this one, because a single feather, bill, or foot can document prey that was accrued only once.

Prey were placed in plastic bags and air dried by opening the bags in a windless situation on sunlit days and fumigated prior to identification at the U.S. National Museum (USNM: Smithsonian Institute). At USNM, we assembled a synoptic series including all known and most of the likely prey species. Because USNM does not have examples for all plumages of all Patagonian birds, we could not determine species on nine individuals.

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Table 1. Avian prey of the Peregrine Falcon in southern Patagonia and Tierra del Fuego.^{1,2} Numbers refer to minimum number of items represented in remains. A plus (+) indicates that a taxa was documented, but the number of items was not reported. Nomenclature follows Sibley and Monroe (1990).

FAMILY	SCIENTIFIC NAME	COMMON NAME	PERES AND		
			McNUTT 1981 ³	PERES 1985 ³	THIS STUDY ³
Rheidae	<i>Rhea pennata</i>	Lesser Rhea		+	1*
Tinamidae	<i>Eudromia elegans</i>	Elegant Crested-Tinamou			2
Podicipedidae	<i>Podiceps major</i>	Great Grebe			1
Procellariidae	<i>Halobaena caerulea</i>	Blue Petrel		+	
	<i>Pachyptila belcheri</i>	Slender-billed Prion		+	
Pelecanoididae	<i>Pelecanoides magellani</i>	Magellanic Diving-Petrel		+	
	<i>Pelecanoides</i> sp.		3		
Ardeidae	<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron			1
Threskiornithidae	<i>Theristicus caudatus</i>	Buff-necked Ibis	7* ⁴	+	1
Anatidae	<i>Chloephaga picta</i>	Upland Goose			1*
	<i>Anas</i> sp.				1
	<i>Anas flavirostris</i>	Speckled Teal	2		1
	<i>Anas platalea</i>	Red Shoveler	1		
Falconidae	<i>Falco sparverius</i>	American Kestrel			2
Phasianidae	<i>Gallus gallus domesticus</i>	Domestic Chicken			1*
Rallidae	<i>Fulica leucoptera</i>	White-winged Coot			1
Charadriidae	<i>Vanellus chilensis</i>	Southern Lapwing	1	+	3 & 2*
	<i>Charadrius falklandicus</i>	Two-banded Plover		+	
	<i>Charadrius modestus</i>	Rufous-chested Plover		+	
	<i>Oreopholus ruficollis</i>	Tawny-throated Dotterel	1	+	7 & 1*
Scolopacidae	<i>Limosa haemastica</i>	Hudsonian Godwit		+	
	<i>Gallinago stricklandii</i>	Fuegian Snipe			1
Thinocoridae	<i>Thinocorus orbignyianus</i>	Gray-breasted Seedsnipe	2	+	4
	<i>Thinocorus rumicovorus</i>	Least Seedsnipe	17	+	5
Laridae	<i>Sterna</i> sp.		2		
	<i>Sterna hirundinacea</i>	South American Tern		+	
Columbidae	<i>Zenaida auriculata</i>	Eared Dove			16
	<i>Metriopelia melanoptera</i>	Black-winged Ground-dove			1
	<i>Columba livia</i>	Rock Dove	+		
Psittacidae	<i>Cyanoliseus patagonus</i>	Burrowing Parakeet			2
	<i>Enicognathus ferrugineus</i>	Austral Parakeet	4		1
Caprimulgidae	<i>Caprimulgus longirostris</i>	Band-winged Nightjar			1
Furnariidae	<i>Geositta cunicularia</i>	Common Miner			3
	<i>Upucerthia dumetaria</i>	Scale-throated Earthcreeper			2
	<i>Eremobius phoenicurus</i>	Band-tailed Earthcreeper			2
	<i>Cinclodes fuscus</i>	Bar-winged Cinclodes	1		
	<i>Cinclodes patagonicus</i>	Dark-bellied Cinclodes	4		
	<i>Leptasthenura aegithaloides</i>	Plain-mantled Tit-Spintail			1
Tyrannidae	<i>Neoxolmis rufiventris</i>	Chocolate-vented Tyrant	1	+	2
	<i>Muscisaxicola macloviana</i>	Dark-faced Ground-Tyrant			1
	<i>Lessonia rufa</i>	Patagonian Negrito			1
Hirundinidae	<i>Tachycineta meyeni</i>	Chilean Swallow			2
	<i>Notiochelidon cyanoleuca</i>	Blue-and-white Swallow			2
Troglodytidae	<i>Troglodytes musculus</i>	Tropical House-Wren		+	
Sturnidae	<i>Mimus patagonicus</i>	Patagonian Mockingbird			1
Muscicapidae	<i>Turdus falcklandii</i>	Austral Thrush	2	+	2

Table 1. Continued.

FAMILY	SCIENTIFIC NAME	COMMON NAME	PERES AND		THIS STUDY ³
			McNUTT 1981 ³	PERES 1985 ³	
Montacillidae	<i>Anthus correndera</i>	Correndera Pipit			1
Fringillidae	<i>Agelaius thilius</i>	Yellow-winged Blackbird			1
	<i>Sturnella militaris</i>	Pampas Meadowlark		+	
	<i>Sturnella loyca</i>	Long-tailed Meadowlark			1
	<i>Molothrus bonariensis</i>	Shiny Cowbird			1
	<i>Phrygilus gayi</i>	Grey-hooded Sierra-Finch			1
	<i>Phrygilus fruticeti</i>	Mourning Sierra-Finch			3
	<i>Phrygilus unicolor</i>	Plumbeous Sierra-Finch			1
	<i>Melanodera melanodera</i>	Canary-winged Finch			1
	<i>Diuca diuca</i>	Common Diuca-Finch			3
	<i>Sicalis luteola</i>	Grassland Yellow-Finch			3
	<i>Carduelis barbata</i>	Black-chinned Siskin			1
Unknown			8	0	9
Total individuals			53+	unknown	102
Total identified individuals			45	unknown	93
Minimum no. species			13	17	42

¹ Not listed is a Kelp Gull (*Larus dominicanus*) observed as prey of a juvenile Pallid Falcon on 10 March 1979 (Ellis and Glinski 1980)

² Nonavian prey include only a lizard (*Liolaemus* sp.) and a small rodent.

³ An asterisk (*) in these columns identifies prey that had not achieved adult size.

⁴ It is not certain that all 7 ibis were nestlings when taken.

We identified feathers by placing materials from one eyrie in a shallow white box and from prior experience sorted the feathers into piles tentatively assigned to a likely taxon. A representative feather was grasped by forceps then compared to specimens of likely donor species. Once a good match for size, color, and pattern was found, the pile of feathers was sorted to remove any that did not represent this species and morph. Then the process was commenced anew. After one of us completed an identification for feathers without unique color patterns (and most passerine primaries do not have bold color patterns), a second person evaluated the feathers and confirmed or rejected the identification. The most difficult materials often required an evaluation extending an hour or more before a certain match was found. Occasionally, a feather had to be washed and blow dried before comparisons could be made. All identified materials were bagged separately and archived.

In comparing feathers, it was often necessary to fan the wing or tail on the museum skin; to do so without tearing the skin required holding the appendage in alignment with the body while deflecting the tip of the feather with forceps. To aid in this process, we prepared flat skins with tail and one wing fanned for about 50 species while in Argentina. For some other species, we merely placed wings, tail, feet, beak, and feathers representing all body areas in a plastic bag. All specimens were delivered to the Argentine Museum of Natural Sciences, Buenos Aires, Argentina, where the most valuable were retained. The remainder were released for export and shipped to the U.S.A.

RESULTS

From this and the previous two studies (McNutt 1981, Peres and Peres 1985), we have documented a fair variety of the prey taken by the peregrine in Patagonia. McNutt (1981) identified 13 prey species and two other genera. Peres and Peres (1985) noted 17 species, of which 10 were new (i.e., not previously noted by McNutt [1981]). The list from our study (Table 1) includes 42 species of which 32 were not previously recorded. In summary, at least 55 prey species in 26 families are known to be taken by peregrines in Patagonia. To this can be added the Kelp Gull (*Larus dominicanus*) recorded as prey of a juvenile Pallid Falcon seen on 10 March 1979 (Ellis and Glinski 1980).

DISCUSSION

Our list does not represent the full range of prey taken by the Peregrine Falcon in South America, because first of all, our study included only the southern fifth of the distribution of this race. Second, other prey species are known to be taken by this falcon in the Falkland Islands (Cawkell and Hamilton 1961) and in more northerly regions of South America (Hilgert 1988). Third, the low numbers of individuals taken for common and likely prey species (e.g., only two Austral Thrushes [*Turdus falcklandii*] and one Patagonian Mockingbird [*Mimus patagonicus*]) suggest that much more variety will come from con-

tinued sampling. The relationship between diversity (i.e., the number of species detected) and sample size can be characterized as beginning with a 1:1 relationship but with the plot soon leveling off and finally approaching an upper asymptote (the true maximum in the number of species taken) only after several hundred prey are tallied (Heck et al. 1975, Marti 1987). At present, the total for all three studies is less than 200 individuals. Further, the two most commonly taken species in Table 1 were represented by only ca. 23 and 16 individuals; before the upper asymptote is reached, we expect that the number of individuals of the most commonly-taken prey will exceed 100.

The list of species taken (Table 1) suggests that the peregrine is prone to capture some prey on the ground. The gosling was observed being taken on a gravel bar. Surely, the young rheas, perhaps the tinamou, and likely some of the other young birds in Table 1 were taken on the ground. In addition to the avian prey tallied, we also recorded one lizard (*Liolaemus* sp.) and a small mammal (Rodentia ca. 40 g); both of these would likely have been taken on the ground (or kleptoparasitized). In South America there is no competing large falcon that hunts terrestrial prey (i.e., like the Prairie Falcon [*F. mexicanus*] in North America and the Saker Falcon [*F. cherrug*] in Europe and Asia) that may constrain the Peregrine Falcon to an aerial foraging niche, so it was to be expected that the peregrine in Patagonia would take quarry on the ground more frequently than do some other races.

It is obvious from the variety of oceanic species on the Peres list (Peres and Peres 1985; Table 1) that their study emphasized coastal areas. Their sample was also from an area where the pallid morph is relatively common (C. Peres pers. comm.). Their results, in comparison with our list for inland eyries, where the pallid morph is rare, suggest that pallid and dark peregrines hunt different prey. To document this potential difference (i.e., to compare the foraging niches of two sympatric color morphs) will surely be an interesting ecological study. Pallid and normal birds appear very different in the field. Pallid birds are less conspicuous and gull-like when seen beneath gray, overcast skies. We propose that the pallid morph may have evolved when conditions were right for a population of pale peregrines to live in isolation from the population of normal peregrines further north on mainland South America.

RESUMEN.—A partir de publicaciones previas, conocemos menos de 100 ítem presa que representan poco menos de 25 especies de aves para el halcón peregrino de la Patagonia (*Falco peregrinus cassini*). Este estudio, incluye presas de 11 nidos, añade 93 presas identificadas representando 42 especies de aves (32 no reportadas previamente), un lagarto, y un mamífero pequeño. Aunque documentamos una considerable variedad de presas para el halcón peregrino en esta región, la frecuencia con la cual nuevas presas fueron encontradas en cada nido visitado,

sugiere que la diversidad de aves tomadas fue mucho más grande que la que se describe aquí. Esta alta diversidad, en parte, resulta de variedades pálidas y de color normal que ocupan nichos de forrajeo un tanto diferentes.

[Traducción de César Márquez]

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